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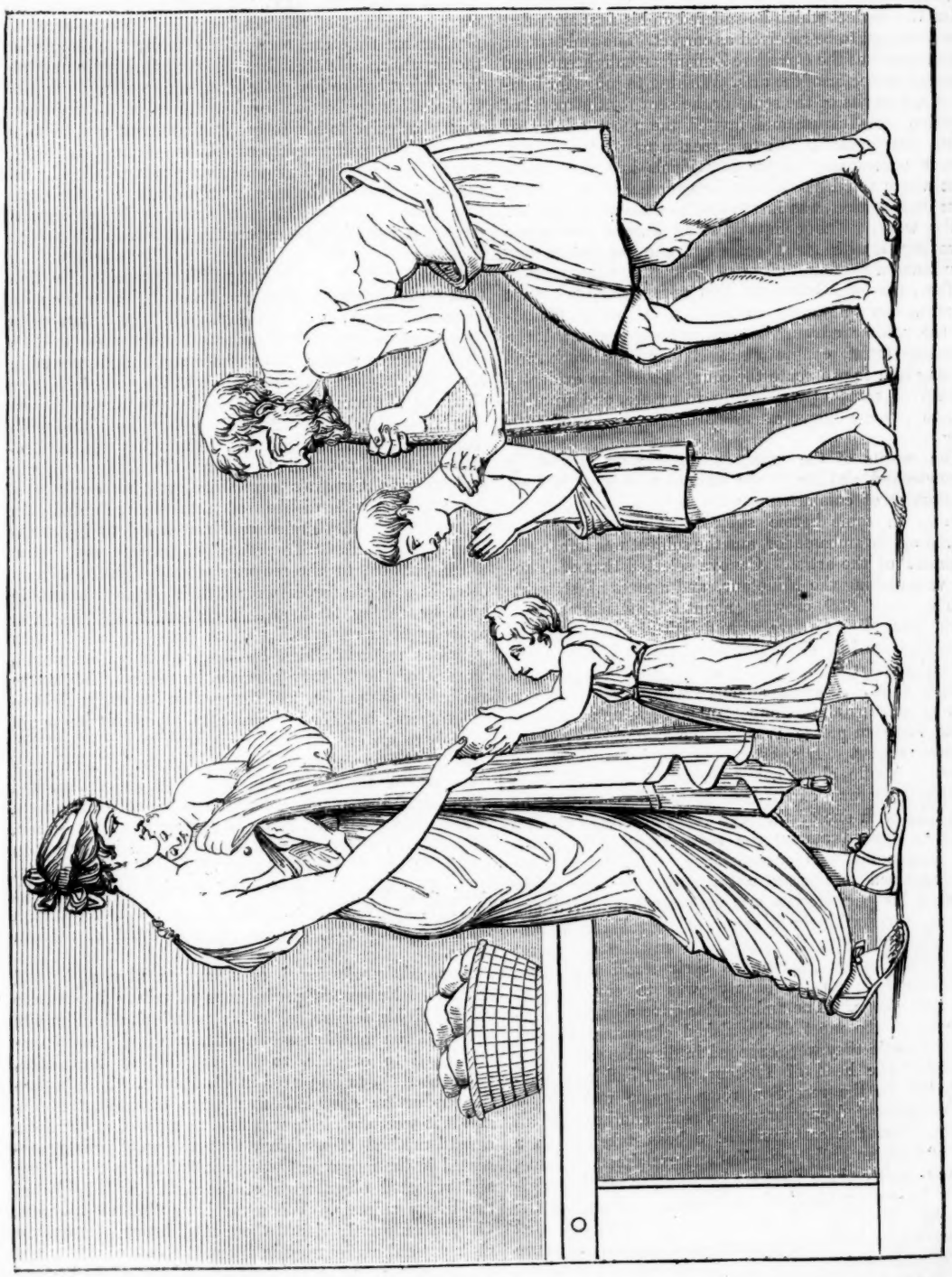


CHARITY. FROM A BASSO RELIEVO BY CANOVA.

CANOVA AND HIS WORKS.

III.

AT the period of Canova's arrival at Rome, painting and sculpture were at a very low ebb. The spirit of improvement which had begun to distinguish the age, in other respects, had not yet extended its influence to these arts. Canova was received in the most gracious manner by the Venetian ambassador, and entertained in his palace. This statement is supported by the letters of Canova himself and by those of the younger Falier; so that the accounts which have appeared of his distress, and of the neglect which he suffered on his first arrival at Rome, are not to be received as correct. The ambassador at that time was the Cavaliere Zuliani, an enlightened and generous protector of the arts. Wishing to judge for himself of the merits of the sculptor, he sent for the model of Dædalus and Icarus; and invited the most celebrated artists and connoisseurs to inspect a new work of art. Canova accompanied these individuals into the apartment where stood his last performance; and previously to its examination, was introduced to them as the author of the work. The company stood around the group surveying it with strict scrutiny; and for some time maintained a profound silence. The style was so different from that of existing art, that each seemed reluctant to venture an opinion on its merits. At length Hamilton the painter advanced, and cordially embraced the trembling artist, congratulating him on his work, and advising him to prosecute the course he had so evidently pursued of constantly referring to nature, and in addition, to pay assiduous attention to the works of antiquity.

The merits of the young sculptor were now fully acknowledged, and his patron Zuliani soon gave him an opportunity of commencing what he had long desired, a group on some heroic subject. The material was ordered by the ambassador, and the subject was left to the judgment of the artist. Canova selected that of Theseus vanquishing the Minotaur, and a mass of statuary marble, value 300 crowns (about 63*l.* sterling), soon arrived, and filled Canova with delight. His letters of this period are full of the praises of the ambassador and admiration of the beautiful marble on which he was about to work. Canova laboured with great diligence but with secrecy at this important task, in an apartment of the Venetian palace to which no one was permitted to have access. His ostensible employment was a statue of Apollo, about half the natural size, which on its completion was exposed to public inspection at the same time with one of the best works of Angelini, who was then ranked among the best sculptors of Italy. Notwithstanding this circumstance, which might have been expected to operate unfavourably for our young sculptor, his performance was very much admired and even compared with the Minerva of Angelini in a manner unfavourable to the latter. Meanwhile the secret labours of Canova approached their termination, and his Theseus in all its beauty was to surprise the people of Rome. The ambassador gave a grand entertainment to the most distinguished characters in that city, and while they were engaged in disputes concerning a model of the head of Theseus, which had been purposely left in the reception room,—some maintaining that it represented one personage, some another, but all agreeing that the cast must have been taken from a work of Grecian sculpture—Zuliana exclaimed, "Come, let us terminate these disputes by going to see the original." All were astonished, and eagerly followed to the spot where Canova's Theseus, victorious over his cruel foe, was placed in the most advantageous light. Pleasure and astonishment pervaded the whole assembly, and the work was unanimously pronounced to be the most perfect which Rome had beheld for ages. Canova was afterwards heard to say that death itself could scarcely be more terrible than the mental sufferings he endured, while the earlier of these occurences was passing.

We must not omit to state that the application of Canova's early patron to the Venetian government was successful in procuring for him a pension of 300 ducats, limited to a term of three years, that he might in Rome perfect himself in his profession and reflect honour on the republic. This pension, though of great importance to the sculptor, did not much exceed 60*l.* sterling per annum.

Canova was now selected to erect a monument in honour of Clement XIV., but hesitated to undertake the work on account of this pension, which he considered as placing his time and occupations under the disposal of the republic. He therefore repaired to Venice and laid the subject before his patrons, who generously left him to direct his application to whatever subjects he deemed most conducive to his future improvement and welfare. Canova now permanently established himself at Rome; but the ambassador Zuliani, having been recalled by the senate, in order to become Plenipotentiary to the Ottoman Porte, the Venetian palace was no longer open to our artist, and he therefore opened a studio in the *Strada Babbuino.*

Canova was in his twenty-fifth year when he thus took up his abode in Rome; and was decidedly the most accomplished artist of the day. He now began to be exposed to the hostility and misrepresentations of envious rivals;—some were envious of the applause bestowed on his Theseus,—others were jealous at his good fortune in obtaining the monument on which he was now employed,—while both classes feared the effect his rising fame might have on their fortunes. Though these circumstances could not fail to wound the feelings of one endued with Canova's sensibility, yet his modesty of deportment, and dislike of reta iation carried him through the trial. Praise or blame failed to injure the tone of his mind. "To praise," he used to say, "what can I answer; to the censures of well-wishers, I must listen in silence; for, if wrong, their feelings would be hurt by telling them so,—if correct, I endeavour to profit by their remarks." When urged to refute some injurious remarks which had been made on his works, in some of the literary journals, he replied, "My works are before the public, and that public has every right to judge them; but, for my own part, my resolution is not to reply to any critical observation whatsoever, otherwise, than by exerting every effort to do better." Two years were passed by Canova in arranging the design and composing the models for the tomb of Ganganelli (Clement XIV.), and two years more in the execution. His labours were most exhausting, for at that time he could not afford to avail himself of the services of others. This long expected work was exposed to the public in 1787, and was found sufficient, of itself, to establish the fame of Canova, as the greatest artist of modern times.

Canova's professional engagements now multiplied rapidly. Numerous productions of minor importance employed his leisure, while his principal attention was bestowed on another monument, which he was commissioned to execute, to the memory of Rezzonico, Clement XII., to be placed in St. Peter's. This beautiful production occupied five years of diligent study, and it is worth while to mention, as a proof of Canova's careful method of working, that the two lions represented in the monument were not finished without long and repeated observation of the forms and habits of the living animals. Wherever lions were to be seen, Canova constantly visited them at all hours, to ascertain their natural expresssion in different states of action and repose, of ferocity or gentleness; and one of the keepers was even paid to bring information, lest any favourable occasion should pass unimproved. One of the most faultless and classical of Canova's works was a statue

of Psyche, executed about this time, and designed as a present to the Ambassador Zuliani, who died while the statue was on its way to Venice. This celebrated figure afterwards became the property of Napoleon, by whom it was presented to the queen of Bavaria.

Two different groups of Cupid and Psyche also occupied the talents of our artist, and by these and other proofs of genius his name and reputation became widely extended. He received a flattering invitation from the Russian court, pressing his removal to St. Petersburgh, which offer he gratefully declined. A monument to Admiral Emo, of Venice, was the next important work in which Canova was engaged, and afterwards the much admired group of the parting of Venus and Adonis. The revolution throughout Europe now checked for a time the progress of the fine arts, and compelled Canova to seek a retreat from scenes which so much excited his abhorrence, in the quiet of his own native village of Possagno. There he remained a year, and occupied himself chiefly in painting.

Soon after his return to Rome, appeared the *Perseus* of Canova. It was a grand and classical production, and was called "Il Consolatore" (the consoler), because it appeared at a time when Rome was mourning the plunder of her galleries and museums. In 1802 Canova presented to Italy the celebrated group of *Creugas* and *Damoxenus*, which was, like the Perseus, purchased by the papal government and placed in the Vatican. Among Canova's heroic compositions, we must likewise mention his statues of Paris; of Palamede; the combat of Theseus with the Centaur; the Hector and Ajax; and the Hercules and Lychas; which last was considered the most terrible conception of Canova's mind. The varied excellence of these performances cannot be here dwelt upon, though each deserves particular notice. Yet, highly as we may esteem Canova's attempts at the grand and terrible, it appears evident that his chief excellence consisted in the faithful representation of graceful and elegant subjects. Hence, his favourite subjects were those of youth and beauty: and hence the fame which resulted from his production of the *Cupid and Psyche*, the *Hebe*, the *Dancing Nymphs*, and above all, the *Graces*. When Italy was stripped of its most valuable sculptures, Florence was deprived of its celebrated "Venus de Medicis," and Canova was engaged to supply a successor. Having stipulated that the statue to be produced should not occupy the vacant pedestal of the absent goddess, or be considered as a presumptuous attempt to *copy* that sublime production, he undertook the work. The Venus of Canova is elegantly conceived, and has a noble expression; but represents the woman rather than the goddess. His *Venus Victorious* afforded him greater satisfaction. This was a statue, the head of which was a portrait of Paolina Buonaparte, Princess Borghese, whose fine style of countenance harmonized admirably with the ideal figure. The *Awakened Nymph* was of a somewhat similar character, and was purchased by his late majesty, George the Fourth.

We have not been able to arrange these performances of our artist precisely according to chronological order, but we must now return to the year 1802 when Canova, at the request of the First Consul, repaired to Paris, and carefully modelled from life the bust of Napoleon. On this occasion he was entertained with munificence, and various honours were conferred upon him. Inducements were also held out to tempt him to take up his residence in Paris; but the prospect of the most flattering distinctions could not wean him from his beloved Italy. He also disliked French taste: "They are not inspired," he would say, "with genuine love of art: it is merely a love of display." Highly interesting conversations passed between Napoleon and Canova, during the stay of the latter in Paris. The humanity of Canova's disposition made him a decided lover of peace, and he took every opportunity of declaring his true sentiments. Buonaparte, who delighted in the conversation of men of genius, often listened with calmness and attention to his views, but when these went near to implicate his own actions, he would exclaim, "Come, citizen Canova, parlate senza tema," (How! citizen Canova, you speak without fear.) "Parlo da nom sincero," (I speak without flattery,) was the laconic reply. By the particular desire of Napoleon, he examined the Musée of the Louvre that he might suggest any improvements in the arrangement of those treasures of which other collections had been despoiled. Being then asked by the consul if he did not think them judiciously arranged, he answered, "They were certainly better placed in Italy." The bust of Napoleon was a noble performance, and faithfully represented the features of that remarkable man, though as years passed, the increasing obesity of the emperor diminished the likeness. It is now in the possession of the Duke of Wellington.

Of the funeral monuments executed by Canova, one of the grandest, most solemn and imposing, was the monument of the Arch-Duchess Maria Christina, daughter of Maria Theresa, and wife of Prince Albert of Saxony. It is placed in the church of the Augustines at Vienna, and consists of nine figures, a lion, and medallion, all of the natural size. The groundwork is a pyramid of grayish marble on a plain square basement, from which two steps lead to a doorway in the centre of the tomb. A train of mourners is approaching this doorway. *Virtue*, a young female of afflicted, yet dignified mien, accompanied by two young virgins, is carrying in an urn the ashes of the deceased. Then follows *Beneficence* supporting an aged and infirm old man, behind whom is a child in the attitude of prayer. Opposite to these is the genius of Saxony, resting on a couchant lion, and mournfully regarding the train. Above, *Felicity* with an attendant cherub is transporting to heaven the portrait of the princess.

In the more simple class of sepulchral marbles, one of the most pathetic is the grand relievo on the tomb for the daughter of the *Marchese di Santa Croce*. This young lady was cut off by sudden illness on the very day appointed for her marriage. The way in which Canova treated the death scene, and the unutterable woe expressed in the countenance of the afflicted mother, was so touching that numbers were surprised into tears at the sight, and a lady who had suffered a similar loss actually fainted away on beholding it.

In 1815, when it pleased the Allied Powers to restore to Italy the treasures of art of which she had been despoiled, Canova was entrusted with the superintendence of their removal, and as soon as this important commission was completed, he set out on a visit to the British metropolis. Here he received the most brilliant welcome from the Prince Regent, and from the nobility and men of talent. Canova always spoke with great satisfaction of this visit, and his friends considered his reception in England as the highest in his long list of honours.

On his return to Rome the title of Marquis of Ischia was conferred on him, with a pension of 3000 crowns per annum. This elevation in rank was received by Canova with his accustomed simplicity and modesty. He attributed every vicissitude in his own lot, as well as in that of others, solely to the dispensations of an all-wise and good Providence. His mind appeared to become more and more susceptible of serious impressions, and he now proposed gratuitously to exercise his skill on a colossal statue of *Religion*. The model filled Italy with admiration, but owing to a disagreement among cardinals and princes as to the site it was to occupy, the obstacles opposed to it caused him to relinquish the work. Canova's income arising from his new dignity was appropriated by him entirely to benevolent purposes. He patronized poor artists, relieved distress, and dealt his bounty liberally among the peasants of his native

village, Possagno. In 1819 he repaired to that spot, and gave the necessary directions for the erection of a beautiful church at his own expense, and every succeeding autumn repeated his visit. In the intervals between these visits he still continued his labours, and by over-exertion at this period is supposed to have hastened his end. The winter of 1821-22 witnessed a more than ordinary amount of labour. Visiting Naples in connexion with his equestrian statue of Ferdinand, the reigning sovereign, that climate which had always proved uncongenial to him, increased a slight illness from which he was suffering. He partially recovered on his return to Rome, and on the succeeding autumn set out for Possagno. This journey appeared to increase his malady; and on leaving that village to return to Rome, he was unable to proceed farther than Venice, where, at the house of his friend Francesconi, he breathed his last. His perfect calmness and resignation prevented his friends from seeing his real danger. He appeared absorbed in meditation, and spoke little. Thus when his friends were admiring the radiant and sublime expression of his countenance, he died on the morning of Sunday, the 13th of October, 1822. He was buried at Possagno with great solemnity, and the news of his decease was received throughout Europe with demonstrations of sorrow.

A WISE Christian will think on rain when the sun shineth, and remember sunshine when dark rainy clouds gather over him.

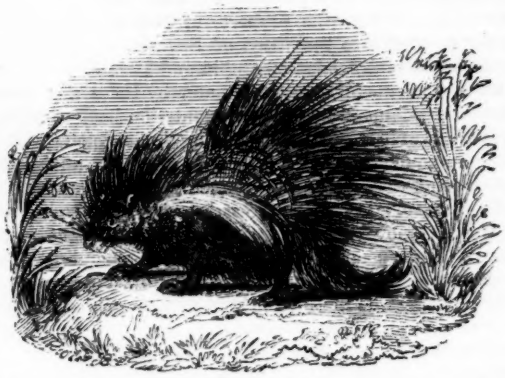
DR. MALKIN, formerly master of the Grammar School at Bury, in Suffolk, has, in a *Father's Memoirs of his Child*, related facts so astonishing of his son, that, though some allowance must be made for the partiality of a parent, they furnish abundant evidence of extraordinary and precocious talent.

Thomas Williams Malkin was two years old before he began to talk, but he was familiar with the alphabet almost half a year sooner. Before he could articulate, when a letter was named, he immediately pointed to it with his finger. From the time that he was two years old, when the acquisition of speech seemed to put him in possession of all the instruments necessary to the attainment of knowledge, he immediately began to read, spell, and write, with a rapidity that would scarcely be credited by any but those who were witnesses of its reality. Before he was three years old he had taught himself to make letters, first in imitation of print, and afterwards of handwriting, and that without any instruction, for he was left to follow his own course in pursuits of this nature. On his birth-day, when he had attained the age of three years, he wrote a letter to his mother in pencil, and a few months afterwards addressed others to some of his relatives. At four, he had learned the Greek alphabet, and made such progress in Latin as to write an exercise every day, with a considerable degree of accuracy. Before he had reached his fifth year he not only read English with perfect fluency, "but," says his father, "understood it with critical precision." He had acquired a happy art of copying maps with neatness and accuracy: he had also made copies from some of Raphael's heads, so much in unison with the style and sentiment of the originals, as to induce good judges to predict that if he were to pursue the arts as a profession, he would one day rank among the most distinguished of their votaries.

In his seventh year he wrote fables, and made one or two respectable attempts at poetical composition: but the most singular instance of a fertile imagination, united with the power of making all he met with in books or conversation his own, is yet to be noticed. This was the idea of an imaginary country, called Allestone, which was so strongly impressed on his mind as to enable him to furnish an intelligible and lively description. Of this delightful country he considered himself as king. He had formed the plan of writing its history, detached parts of which he had actually executed. He drew a map of this country, giving names of his own invention to the principal mountains, rivers, cities, sea-ports, villages, and trading towns. This was one of the last efforts of his genius, for this youthful prodigy of learning died before he had completed the seventh year of his age.

THE PORCUPINE,

Hystrix cristata.



VARIOUSLY modified as are the substances which form the covering of animals, yet they may in general be referred to three primitive types, *i.e.*, hair, feathers, and scales. We are therefore somewhat surprised to find a covering of a perfectly distinct nature, possessed by a tribe of animals, small in number, and unimportant in their position and character. The Porcupine, hedge-hog, and a few other animals, though not particularly exposed beyond others to hostile attacks, or of a nature to make aggressions on the animals around them, are yet provided with formidable weapons, in the thick and bristling spines with which they are covered, and which present an impregnable barrier to their enemies.

The Porcupine belongs to the order *rodentia*, or gnawers, of which we have lately given several examples, in the squirrel, dormouse, &c. It has long been naturalized to the south of Europe, whither, as Agricola informs us, it was brought either from Africa or India. It differs, from the Porcupine now seen in Africa, only in having the spines rather shorter and less powerful. The European variety is found chiefly in the kingdom of Naples, and in the southern part of the Roman states. It is one of the largest animals of the Roman states. It is one of the largest animals of the rodentia order, measuring from the nose to the tail nearly three feet.

It has a dull, heavy, and somewhat unpleasant appearance; the eyes are extremely small, the nostrils thick, and the muzzle obtuse. Beside the spines, the body is provided with two sorts of hair, one long and bristly, the other curly and woolly. The head and neck are furnished with the long and bristly kind of hair, and the animal has the power of erecting it, in the same way as the spines. These latter constitute most formidable weapons; they are the largest and strongest on the sides of the animal; and have the structure of the shafts of feathers, covered with enamel, and tapering to a sharp, hard, and fine point. The belief that Porcupines have the power of darting their spines against those who attack them, is altogether unfounded.

The habits of the Porcupine are peaceable and retired. It avoids populous parts, and chooses some solitary spot, where the soil is dry and stony, and exposed to the south-east or south, for the formation of its burrow. The short muscular limbs, and powerful claws of the porcupine, are well adapted for making the necessary excavation. This is generally very deep, and has two or three outlets. In this retreat it hybernates during the colder months, but does not fall into so deep a lethargy as some of the other genera. On the first fine day of spring, it may be found awake again, and in search of food. Its extreme timidity causes it to remain in its burrow during the day-time, and the time for procuring its food is, therefore, from evening twilight till sunrise. As darkness approaches, it cautiously draws near to the principal entrance of the burrow, and looks around to see that all is safe; nor will it venture itself entirely out-

side while there is any reason to apprehend danger. When, in the search after food, it meets with an unexpected attack, it always endeavours to regain its burrow; but if this is impossible, it turns away its head, and presents its side, where, as we have said, the spines are strongest. It has likewise the power of rolling itself up into a ball, in the manner of the hedge-hog, and thus presenting to its adversary an uninterrupted surface of spears. Notwithstanding the anxiety which it always evinces to keep its head from injury, there are few animals that can bite harder, or inflict more deep and dangerous wounds. The power of its teeth may be observed in its efforts to escape when kept in confinement. The thickest and hardest boards soon yield to its constant gnawing, and even strong iron wire is insufficient to keep it; the cage, therefore, is generally lined with sheet-iron.

The senses of the Porcupine appear to be, with the exception of smell, extremely obtuse: the ears are but little developed, the eyes small, and the tongue but little extensible. The food of this animal consists of roots, fruits, and tender leaves. Thunberg states, that its usual food, near the Cape, is the root of a beautiful plant called *Calla Æthiopica*, which grows even in the ditches, about the gardens; but he adds that it will frequently deign to put up with cabbages and other vegetables, and sometimes commits great depredations in those gardens.

The ordinary powers of inferior animals, are in general wholly insufficient to avail against the spines of the Porcupine: it has, therefore, in fact, few enemies to fear but man, who esteeming the flesh of this animal as good and agreeable to the palate, frequently hunts, or seeks it out for the gratification of his appetite. Porcupines are commonly brought to the markets at Rome and sold for food. They are eaten roasted by the Brazilians, the Brazil variety being generally fat, and its flesh white. The negroes of Guinea make great use of them, and they are also used as food at the Cape. The method of taking them is often as follows. The breach by which this depredator enters gardens is first discovered; a musket is then loaded, cocked, and placed opposite to the breach. To the trigger of this musket a string is tied, and led along the barrel to the muzzle, where a carrot or turnip is fixed. The porcupine, by taking this bait, pulls the trigger and is shot.

Porcupines, properly so called, are distributed through India, Southern Tartary, Persia, Palestine, the south of Europe, and all parts of Africa. They are called *Hystrix*, by the Greeks and the ancient Italians; *Istrice*, by the modern Italians; *Porcépic*, by the French; and *Stachelschwein*, *Dornschwein*, and *Porcopick*, by the Germans; all these names arising from their harsh bristly hairs, like those of the hog. The specific name *cristata*, (tufted, crested, Lat.,) was given by Linnæus, on account of a sort of mane on the neck and back of this species.

The Canada Porcupine, (*Hystrix dorsata* of Linnæus, and *Urson* of Buffon,) is a very sluggish animal, with remarkably long hair, and short spines; the latter are scarcely discoverable through the hair, except on the head, crupper, and tail. They are, however, strong and sharp, and are said to be so formed, as to appear when magnified as if barbed at the tip with numerous reversed points or prickles. Like the spines of the common porcupine they are but slightly attached to the skin, and can be loosened with great ease: the animal is so far aware of this circumstance, that when annoyed or disturbed it will sometimes brush against the legs of the offending party, and leave several of the spines sticking in the skin. These spines often prove fatal to wolves and dogs in the countries where this animal abounds.

Their points, (says Dr. Richardson,) which are pretty sharp, have no sooner insinuated themselves into the skin of an assailant, than they gradually bury themselves and travel onwards until they cause death by wounding some vital organ. These spines, which are detached from the porcupine by the slightest touch, and probably by the will of the animal, soon fill the mouths of the dogs who worry it, and unless the Indian women carefully pick them out, seldom fail to kill them.

The larger kinds of snake are great enemies to the porcupines; but at the same time destroy themselves by this prickly kind of food. The snake seizes the porcupine by the head, and sucks it in; the quills which were flattened down while the body was going in, afterwards become erect and kill it. An enormous snake has been found dead with the quills of the porcupine sticking through his body.

The haunts of the Canada Porcupine are easily discoverable by the appearance of the trees in the vicinity, the bark of which is its favourite food. It feeds on the bark of several of the fir tribe, and on the buds of various kinds of willow; it is said also to be fond of sweet apples and young maize, which it eats in a sitting posture, holding the food to its mouth with the fore-paws. It makes its retreat under the roots of trees, and sleeps a great deal. It has been observed to dislike being wetted; but the vicinity of water is requisite to it, since it drinks freely in summer, and when streams are no longer accessible it swallows the snow.

The flesh of this animal is said to taste like that of the pig; it is relished by the American Indians, but soon becomes exceedingly distasteful to Europeans. The fur is likewise used; being first deprived of the spines, which are employed by the women as pins. They are also dyed of various bright colours, and worked into belts, shoes, shot-pouches, &c.

The Prehensile-tailed Porcupine, or Couendon, (*Hystrix prehensilis* of Linnæus,) is distinguished by its long, tapering, and pointed tail, one half of which, as well as the whole of the body, is covered with spines. It is a native of many parts of South America, and is formed for living in trees. It is a sluggish animal, and appears to bear a close resemblance to the Canada Porcupine, living in woods, sleeping by day, and feeding on fruits and bark by night. It climbs trees by means of its prehensile tail and of its claws, but is observed to use the former chiefly in descending. When on the ground the motions of this animal are awkward, and it appears quite out of its element, but when hunger rouses it to action it seeks for sustenance in trees, and climbs with some degree of activity. The cry of the Prehensile Porcupine is said to resemble that of a sow; and in defending itself from its enemies, it uses its spiny covering in the same manner, and with similar effect to that of the species before described.

The practice of a bad man is contradicted by the voice of his own heart. When he has committed a fault it declares to him that he might have chosen a contrary part: when he has done a virtuous action it inspires emotions of joy which render him conscious that he is a free agent. This voice within is anterior to all reasoning, and as incapable of being invalidated as any other consciousness.—F.

ON AUTOMATON FIGURES.

2.

In a former article, we have described several singular machines which the ingenuity of mechanists had devised, by which the actions of living creatures were more or less imitated. We proceed to speak of others, in which the human figure and movements were the object of imitation.

Whether or not it be true, as is stated, that Dædalus made a statue, which, if not detained, would run away, is not easy now to determine; we will therefore proceed to later dates. More than one Androides has been constructed, in which the figure wrote and drew. The figure was placed at a table, with a pen or pencil in its

hand, and paper before it. The spectator was desired to dictate any word at pleasure, which was instantly written down by the androides in a fair and legible hand. But in such a case, there is a certain degree of cheating employed; for there is an assistant behind a partition near the figure: the assistant can hear the question asked, and puts in action some machinery of levers, &c., connected with the hand of the figure, by which the words are written down. Still, there is something much more elaborate in this, than in the deception called the *Invisible Girl*, the nature of which was described in the *Saturday Magazine*, vol. 1., p. 61.

Some years ago, Mr. Collinson, in a letter which he wrote to Dr. Hutton, after describing some very ingenious automata constructed by M. Droz, of Neufchatel, says:—

Permit me to speak of another automaton of Droz's, which several years since he exhibited in England, and which, from my personal acquaintanee, I had a commodious opportunity of particularly examining. It was the figure of a man, I think the size of life. It held in its hand a metal style (pencil), a card of Dutch vellum being laid under it. A spring was touched, which released the internal clockwork from its stop, when the figure immediately began to draw. M. Droz, happening once to be sent for in a great hurry to wait upon some considerable personage at the west end of the town, left me in possession of the keys which opened the recesses of all his machinery. He opened the drawing-master himself, wound it up, explained its leading parts, and taught me how to make it obey my requirings, as it had obeyed his own: Droz then went away. After the first card was finished, (*i.e.*, after the first drawing was finished,) the figure rested. I put a second, and so on, to five separate cards, all different subjects; but five or six was the extent of its delineating powers. The first card contained, I may truly say, elegant portraits and likenesses of the king and queen, facing each other; and it was curious to observe with what precision the figure lifted up his pencil, in the transition of it from one point of the draft to another, without making the least slur whatever; for instance, in passing from the forehead to the eye, nose, and chin, or from the waving curls of the hair to the ear, &c. I have the cards now by me.

It is evident from this description, that the drawings were made by a strictly automatic figure, without the aid of a concealed associate.

A still better figure, of a somewhat similar kind, was afterwards constructed by Maillardet. This was the figure of a boy, kneeling on one knee, and holding a pencil in his hand, with which he executed not only writings, but also drawings of great excellence. When the figure began to work, an attendant dipped the pencil in ink, and laid the paper on a brass tablet, which was adjusted to a proper position. On touching a spring, the figure began to write, and when the line was finished, the *t*'s were crossed and the *i*'s dotted by distinct movements of its pencil. In this way it executed four beautiful specimens of writing, in French and English, each consisting of several lines. It also drew three landscapes, which, with the writing, occupied about an hour.

The same mechanist constructed an automatic soothsayer, which gave answers to questions asked. He held a wand in one hand, and a book in the other. The questions were engraved on oval medallions. When a spectator put one of these into an open drawer, situated near the figure, it instantly closed with a spring. The figure then rose, bowed, drew circles with his wand, and consulted his book. Having spent some time in apparent study, he lifted his wand, and striking with it the wall above his head, two folding doors flew open, and displayed an inscription denoting the answer to the question. Should the drawer be empty when shut, the soothsayer rose, consulted his book, shook his head, and sat down again: the doors did not fly open. If two medallions were put in together, an answer was given to the lower one. It was, we believe, undoubted, that this exhibition was strictly automatic,—that no concealed confederate was at work.

Some beautiful imitations of musical performers have been constructed. The most celebrated was Vaucanson's flute player. This was exhibited at Paris just about a century ago. It consisted of a figure capable of playing several airs on the German flute, with a precision and delicacy nearly equal to that displayed by a living performer. The figure was about five feet and a half high, and was situated on a fragment of rock fixed upon a square pedestal, four feet and a half high, by three and a half broad. Vaucanson, with a candour that does not often distinguish inventors of this kind, published a work in which every part of the machinery was minutely described. The machinery consisted of a series of bellows, pipes, levers, cranks, wheels, springs, &c., of such extreme complication, that any attempt to describe it here would be tedious and useless. We will merely say that the flute was a *bonâ fide* one, that wind was propelled into the embouchure or mouth hole from the lips of the figure, and that the finger holes of the flute were covered by the fingers of the figure in exact accordance with the changes in the notes desired to be produced. The machine, altogether was so scientific, that it excited the admiration of philosophers, even more than of mere lovers of the marvellous.

The same individual afterwards constructed a pipe and tabor player. This was a figure mounted on a pedestal, and dressed like a shepherd, and was capable of playing about twenty minuets, country dances and other tunes, on a pipe and tabor. These were instruments better known among the pastoral tribes of bygone days, than by the present age. The tabor was a kind of tambourine, struck not with the hand, but with a stick. The pipe was a kind of flageolet with only three finger-holes, so that one hand only is required to play it. Its simplicity, however, is accompanied by a circumstance which renders the automatic performance of it a matter of extreme difficulty; for as there are only three finger holes, a large share of the diversity of tones produced is effected by varying the intensity of the breath or air blown into the instrument. This is difficult to effect by machinery, consequently Vaucanson's pipe and tabor player gained almost as much admiration as his flute-player.

About thirty years ago, Maillardet exhibited an automaton piano-forte player. This was an elegant female figure, seated at a piano-forte, on which she played eighteen tunes. Besides the execution of the music, which was produced by the actual pressure of her fingers on the keys, all her movements were elegant, graceful, and almost life-like. Before beginning a tune, she made a gentle inclination with her head to the auditors: her bosom heaved; and her eyes followed the motion of her fingers over the finger-board. The hands played the natural notes, and the feet played the flats and sharps by means of pedals. This machine was strictly automatic, for when once wound up, it would continue playing for an hour; and the principal part of the machinery employed was freely laid open for inspection.

The latest automatic musician with which we are acquainted, is one constructed by Maelzel, the inventor of the metronome, or time-beating instrument. This automaton, as described in the *Journal des Modes*, was as follows:—From a tent M. Maelzel led out a fine manly-looking martial figure, in the uniform of a trumpeter of the Austrian dragoons. After the figure had been pressed on the left shoulder, it played not only the Austrian cavalry march, and all the signals for the manœuvres of the army, but also a march, and an allegro by Weigl. After this, the dress of the figure was completely changed into that of a French trumpeter of the guard. It then began to play the French cavalry march, also all the signals of the French cavalry manœuvres, as well as a march by Dussek, and an allegro by Pleyel. The sound of the trumpet was said to be pure, and more agreeable than even the ablest musician

could produce from that instrument, because the breath of a man gives the inside of the trumpet a moisture which is prejudicial to the purity of the tone.

This same Maelzel was the inventor of several instruments, of which inferior imitations are seen in the London streets at the present day; that is, a machine in which imitations of a great number of musical instruments are combined. In one which Maelzel exhibited at Vienna, pieces of Turkish music were produced, as if played by a band of flutes, pipes, cymbals, triangle, double drum, and four trumpets. The trumpet sound was admirable. It was produced from real trumpets, blown by a blast of air within the machine. A double bellows furnished the wind, and a wheel, acted on by a weight, set the whole in motion. The modern instrument to which we have alluded is a kind of hand organ, with a feeble imitation of two or three other instruments.

The most difficult automata destined to produce sound, are those which imitate *speech*. A thorough anatomical examination of the organs of voice is necessary to succeed in these attempts. M. Kempelen, of Hungary, and in our own day Mr. Willis, of Cambridge, have shown that it is possible to produce instruments capable of imitating the sounds of the human voice. But we are not aware how far a strictly automatic speaking figure has been produced; yet it is said that a machine constructed by Kempelen was able to utter these words and sentences:—*opera*,—*astronomy*,—*Constantinople*,—*Vous êtes mon ami*,—*Je vous aime de tout mon cœur*,—*Leopoldus Secundus*,—*Romanum imperator semper Augustus*. In our own day the subject has been taken up by Professor Wheatstone, who exhibited a speaking automaton at the Dublin meeting of the British Association for the advancement of science. In consequence of the recent and important discoveries respecting the mechanism of the human voice, it will not be hazarding too much to say with Sir David Brewster, that "before another century is completed, a *talking* and a *singing machine* will be numbered among the conquests of science."

The last automaton which we can find room to describe, is a rope-dancer, exhibited in London some years ago. This was a little figure, a few inches high, seated on a slender steel rod, which he grasped with both hands. When a spring was touched, the figure descended, but still hung suspended by the hands. After several oscillations, the tumbling began, which consisted in assuming a great variety of attitudes,—sometimes closing the feet and hands together, and swinging with great velocity around the rod. During the tumbling, a musical instrument played by means of other parts of the machinery. After going through all the evolutions, the figure rose up, seated itself on the rod, and bowed to the spectators. An elegant and beautiful automaton of this description is now shown at the Gallery of Practical Science.

We hope the reader will not entertain the idea that many of these details are too *magical* to be true. The magic employed is a very extensive knowledge of mechanical details, an intimate examination of the manner in which sounds are produced by air passing through pipes, and very likely, the attractive force of magnetism. All these are, in one way or other, employed in the production of the startling effects here detailed.

ON THE MANUFACTURE OF GLUE.

THE preparation of this useful article forms a curious and important branch of national industry. The chief use of glue is for binding or cementing pieces of wood together, as practised by the carpenter and cabinet-maker, in which trades very large quantities are constantly employed.

Glue (which is nothing more than gelatine in a dry state) is obtained from the hides, hoofs, and horns of animals; the refuse of the leather-dresser, and the offal of the slaughter-house; ears of oxen, calves, sheep; parings of parchment, old gloves; and, in short, animal skin and (by a late improvement) bones, are all employed for making glue.

The first process in this manufacture is to free the materials from dirt, blood, and other matters which do not afford glue. For this purpose they are steeped in lime and water, and then placed in baskets, and rinsed by the action of a stream of water. They are then removed to a sloping surface, and allowed to drain, and whatever lime remains is deprived of its caustic property by the re-absorption of carbonic acid from the atmosphere, since the presence of lime would prove injurious in the subsequent processes.

The gelatine is removed from the animal matter by boiling. This process is effected in a somewhat shallow boiler, which is provided with a false bottom, pierced with holes, and elevated a few inches, thus serving as a support to the animal matter, and preventing it from burning by the heated bottom of the boiler. The boiler is filled about two-thirds with soft water, and then the animal substances are added: these are piled up above the brim of the boiler, because soon after boiling commences, they sink down below the level of the liquid. The contents of the boiler are occasionally stirred up and pressed down, while a steady boiling is maintained throughout this part of the process.

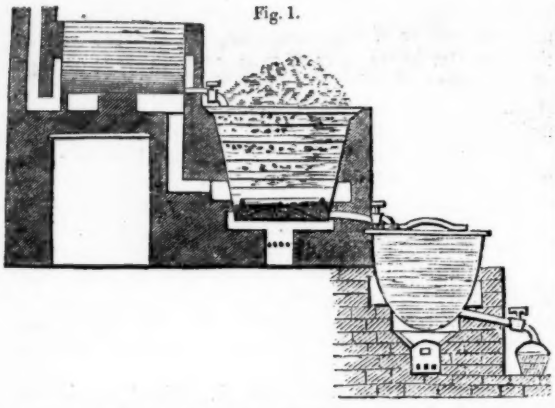
As the boiling proceeds, small portions of the gelatine are drawn off into egg-shells, when, in the course of a few minutes, if the liquid gelatine becomes, by exposure to the cool air, a clear mass of jelly, the boiling process is complete,—the fire is smothered up, and the contents of the boiler left to settle for ten or twenty minutes. The stop-cock is then turned, and the gelatine flows into a deep vessel, kept hot by being surrounded with hot water, and thus it remains for several hours, during which time it deposits any solid impurities. It is then drawn off into congealing boxes, and prepared as we shall soon explain.

The undissolved matter in the boiler is treated with boiling water a second, and even a third time, and the above process continued until nothing more can be extracted. The subsequent solutions are often too weak to be made into glue, but they are economically used with fresh portions of animal matter.

A clear idea may be formed of this part of the manufacture by the annexed illustration (fig. 1.), which represents a section of three vessels, on different levels. The uppermost vessel, which is heated by the waste heat of the chimney, supplies the animal matter contained in the second vessel with warm water: the third vessel receives the liquid gelatine, and retains it in a fluid state, while the solid impurities are being deposited.

The gelatine is drawn off from this third vessel into buckets, and conveyed to the congealing boxes. These boxes are of deal, of a square form, but somewhat narrower at bottom than at top. The liquid glue is poured through funnels, provided with filter-cloths, into the boxes until they are entirely filled. This process is conducted in a very cool and dry apartment, paved with stone, and kept very clean, so that any glue which may be spilt may be recovered. In twelve or eighteen hours the liquid glue becomes sufficiently firm for the next process, which is performed in an upper story, furnished with ventilating windows, so as to admit air on all sides. The boxes are inverted on a moistened table, so that the cake of jelly may not adhere to it: this cake is cut into horizontal layers, by means of a brass wire, stretched in a frame, and is guided by rulers, so disposed as to regulate the thickness of the cake of glue. The slices thus formed are carefully lifted off, and placed on nets stretched in wooden frames. As these frames are filled they are placed over each other, with an interval of about

Fig. 1.



three inches between every two frames, so that the air may have free access. Each frame is so arranged as to slide in and out like a drawer, to allow the cakes to be turned, which is done two or three times every day.

An experienced writer on manufactures thus observes, concerning this part of the process:—

The drying of the glue is the most precarious part of the manufacture. The least disturbance of the weather may injure the glue during the two or three first days of its exposure. Should the temperature of the air rise considerably, the gelatine may turn so soft as to become unshapely, and even to run through the meshes upon the pieces below, or it may get attached to the strings and surround them, so as not to be separable without plunging the net into boiling water. If frost supervene, the water may freeze, and form numerous cracks in the cakes. Such pieces must immediately be re-melted and re-formed. A slight fog even produces upon glue newly exposed a serious deterioration, the damp condensed upon its surface occasioning a general mouldiness. A thunderstorm sometimes destroys the coagulating power in the whole laminæ at once, or causes the glue to *turn* on the nets, in the language of the manufacturer. A wind too dry or too hot may cause it to dry so quickly as to prevent it from contracting to its proper size, without numerous cracks and fissures. In this predicament the closing of all the flaps of the windows is the only means of abating the mischief. On these accounts it is of importance to select the most temperate season of the year, such as spring and autumn, for the glue manufacture.

When the glue is properly dried a gloss is imparted to each cake, by dipping it in hot water, and passing over it a brush, also wetted with hot water. The cakes are then placed on a hurdle, dried in the stove-room, or in the open air, if the weather be sufficiently dry and warm It is then packed in casks for sale.

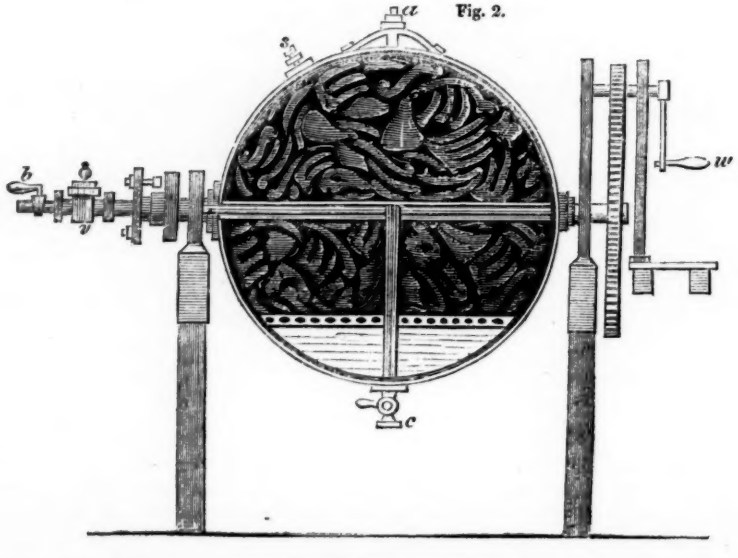
A few years ago Mr. Yardley, of Camberwell, obtained a patent for manufacturing glue from bones, of which nearly one-half the weight consists of solid gelatine.

In this patent process the bones are thoroughly cleansed by being washed in water and lime for three or four days: they are then placed in the globular vessel, called an *extractor*, of which the annexed cut (fig. 2) is a section. The aperture through which the bones pass into the vessel is at *a*, which aperture is closed by screwing up an internal plate tightly against the interior surface of the vessel. The extractor turns upon a horizontal axis, consisting of a strong tube, which at the centre of the vessel proceeds downwards, and conveys steam below the grating upon which the bones rest. Steam, of the pressure of about fifteen pounds on the square inch, is admitted from a boiler, by turning the cock *b*, and passing along the tube, which is furnished with a safety-valve at *v*, it passes to the bottom of the extractor, then rises up through the grating and amongst the bones, and expels all the air from the vessel, through a stop-cock at *s*, which being closed the extractor soon becomes charged with steam. The extractor is moved slowly round by means of the wheel-work at *w*, to shift the position of the bones, and allow the steam to act more perfectly. When at rest, a quantity of the fluid glue collects at the bottom of the vessel, and is drawn off at the cock *c*. The steam continues to act upon the bones for about an hour before the liquid gelatine is drawn off. After every drawing off the steam is admitted, and the process continued as before. The gelatine is collected in an evaporating vessel, and heated until sufficiently thick to solidify when cold: it is then prepared in the usual manner.

It has been found by experiment that when two cylinders of dry ash, one inch and a half in diameter, were glued together, and after twenty-four hours torn asunder, a force of 1260 pounds was required to produce the separation, thus making the force of adhesion equal to 715 pounds per square inch. Another experiment made the force of adhesion to equal 4000 pounds on the square inch.

A delicate kind of glue is prepared by gently boiling shreds of parchment in water, in the proportion of one pound of parchment to six quarts of water, until it be reduced to one quart. It is then strained and boiled to the consistence of glue. Isinglass glue is best prepared by gently heating that substance in spirit.

Fig. 2.



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